

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the manufacture approach of a chip-like thin film resistor and a thick film resistor in more detail about the manufacture approach of a chip resistor.

[0002]

[Description of the Prior Art] Generally on the surface of the chip resistor (a thin film resistor and thick film resistor), label marks, such as an alphabetic character for resistance discernment etc. and a mark, are given. The resistor layer prepared on the insulating substrate is conventionally prepared in the above-mentioned label mark by printing of screen-stencil etc., imprint, etc. on the protective layer of wrap glass.

[0003]

[Problem(s) to be Solved by the Invention] The above-mentioned chip resistor is also miniaturized along with the miniaturization of the electronic parts which advance increasingly recently, and it is becoming impossible however, to be unable to respond in printing and the imprint which are the conventional label mark formation approach.

[0004] For example, with the chip resistor whose geometry is 1.6x0.8mm, a actual label mark part is set to about 1.0x0.6mm or less, and it becomes indefinite with a thin line with a width of face of about 50 micrometers or more writing it. However, the above-mentioned printing or an imprint will fade that it is incongruent to a detailed label mark, and is going to form a thin line with a width of face of about 50 micrometers or less, or a blur will produce it.

[0005] Moreover, since the above-mentioned label mark is formed on the surface of the protective layer, a label stamp face will be in an exposure. therefore, the time of conveyances usually performed according to the process after the label mark in a production process, for example, the production process of a chip resistor, in the detailed thing which a label mark depends on the above thin lines, such as a braking process and a plating process, etc. -- setting -- the contact with various manufacture devices, a case, etc. -- or grind -- or it is based on components -- grind -- a label mark becomes it blurred "to be alike", or it disappears.

[0006] Furthermore, in a chip resistor front face, the irregularity of ***** will arise in ** by which a label mark is formed in the maximum upper layer. If the dimension of a chip resistor becomes small, the above-mentioned irregularity will reduce the adsorption power of the adsorption collet at the time of mounting, and will cause poor mounting.

[0007] This invention solves the above-mentioned problem, enables a sharp notation also with a detailed label mark, and aims at offering the manufacture approach of the chip resistor which the blur of a label mark, disappearance, etc. do not produce.

[0008]

[Means for Solving the Problem] It found out that the front face of a chip resistor could moreover be made smooth, without this invention person's having performed the label mark in a chip resistor by the photolithography method, as a result of repeating research wholeheartedly in view of the actual condition of the above-mentioned technique, and the pattern of a label mark having been sharp at the time of a wrap, could tend to read this label mark by transparency thru/or the translucent resin protective layer, and the blur of a label mark, disappearance, etc. arising.

[0009] That is, this invention relates to the manufacture approach of the following chip resistors.

[0010] (1) The manufacture approach of the chip resistor characterized by preparing transparency thru/or a translucent resin protective layer so that a photopolymer may be applied on the insulating substrate with which the resistor layer was formed, may carry out exposure processing of the above-mentioned photopolymer with the mask with which the predetermined label mark pattern was formed, negatives may be developed, a label mark pattern may be formed and the above-mentioned resistor layer and a label mark pattern may be covered.

[0011] (2) The process which forms a resistor layer on an insulating substrate, and the process which

trims a resistor layer and adjusts resistance, The process which applies a photopolymer on the above-mentioned insulating substrate containing the above-mentioned resistor layer, The process which forms a wrap protection pattern and a label mark pattern for the trimming slot which carries out exposure processing of the above-mentioned photopolymer with the mask with which the predetermined pattern was formed, develops negatives, and is formed by the above-mentioned trimming, The manufacture approach of the chip resistor characterized by including the process which prepares transparency thru/or a translucent resin protective layer so that the above-mentioned resistor layer, a protection pattern, and a label mark pattern may be covered.

[0012]

[Function] Since a label mark is performed by the photolithography method, the clear notation which fades even if it is the thin line of the width of face of 1-micrometer order and which is not attained.

[0013] A trimming slot can be certainly fill uped with adjusting a photopolymer to hypoviscosity to label mark formation and coincidence.

[0014] Since transparency thru/or a translucent resin protective layer are prepared, a blur or disappearance of a label mark does not arise, but moreover, a front face can be made smooth.

[0015]

[Example] Although the example at the time of applying the manufacture approach of this invention to a chip-like thick film resistor is explained hereafter, referring to a drawing, this invention is not limited to these examples.

[0016] Drawing 1 thru/or drawing 3 are drawings showing the example of this invention, drawing 1 shows the sectional view of the thick film resistor obtained by the approach of this invention, and drawing 2 is a top view explaining the approach of this invention. these drawings -- setting -- a sign 1 -- an insulating substrate -- 2 -- a resistor layer -- 3 -- a label mark patterned layer -- in 4, 5 shows an electrode layer and 6 shows a photopolymer layer for a resin protective layer.

[0017] In drawing 1 , the label mark patterned layer 3 is formed on the resistor layer 2. Here, although prepared on the resistor layer 2, the above-mentioned label mark patterned layer 3 may be formed so that a part thru/or all of the label mark patterned layer 3 may start on the insulating substrate 1. And above-mentioned ***** 3 is covered by transparency thru/or the translucent resin protective layer 4 with the outcrop of the resistor layer 2.

[0018] Next, this example is more concretely explained based on drawing 2 (a) - (d).

[0019] Resistance is adjusted forming the resistor layer 2 and the electrode layer 5 on the insulating substrate 1, trimming the resistor layer 2 with laser etc. after that, and forming the trimming slot 7, as shown in drawing 2 (a).

[0020] As shown in drawing 2 (b), the photopolymer layer 6 is formed so that it may become about 1-10 micrometers of thickness on the resistor layer 2 prepared as mentioned above. The photopolymer layer 6 can apply a photopolymer with a spin coat, a roll coat, etc., and can prepare it by performing temporary desiccation. It can be used widely, without limiting the resin which discovers the same operation as the negative mold and positive type in the above-mentioned photoresist as the above-mentioned photopolymer by light (ultraviolet rays are included) besides the photoresist of a well-known negative mold and a positive type, and photosensitive polyimide resin etc. can more specifically be illustrated. Moreover, as for the above-mentioned photopolymer layer 6, it is desirable to be colored by the pigment etc. so that contrast with the layer used as a substrate may become high.

[0021] Next, as shown in drawing 2 (c), sensitization processing is carried out using the mask with which the predetermined label mark pattern was formed in the above-mentioned photopolymer layer 6, a development is carried out, predetermined developer, for example, alkali system organic solvent etc., etc., it leaves a required part (label mark patterned layer 3), and the photopolymer layer 6 is removed. By the above-mentioned sensitization processing, when hardening of the label mark patterned layer 3 is inadequate, light may be again irradiated after the above-mentioned development, and hardening may be promoted further.

[0022] In this example, although the photopolymer layer 6 on the trimming slot 7 was removed, as shown in drawing 3 , it may leave the photopolymer layer 6 so that the trimming slot 7 may be filled,

and protection patterned layer 3a may be formed with the label mark patterned layer 3. As for the photopolymer layer 6, at this time, being adjusted and applied to hypoviscosity is desirable, the trimming slot 7 can be covered without a clearance by doing in this way, it is lost that a pinhole is generated from the air in the trimming slot 7 when the above-mentioned resin protective layer 4 is formed, or the clearance which is well-informed about the open air arises from the trimming slot 7, and the adverse effect to the resistor layer 2 by moisture encroachment etc. can be prevented more certainly. [0023] Moreover, although the label mark patterned layer 3 is provided in drawing 2 (c) so that it may leave the photopolymer layer 6 of *****, only ***** is removed and you may make it leave the photopolymer layer 6 of the perimeter.

[0024] and it is shown in drawing 2 (d) -- as -- the outcrop of the label mark patterned layer 3 and the resistor layer 2 -- a wrap -- like -- screen printing and FOTORISO -- the translucent resin protective layer 4 which differs from the foreground color of transparency or the label mark patterned layer 3 by law etc. is formed.

[0025] Above, although the approach of this invention was explained about the thick film resistor, the approach of this invention can apply it also in manufacture of a thin film resistor.

[0026]

[Effect of the Invention] The manufacture approach of this invention does the following effectiveness so.

[0027] (1) Even if it is a small chip, a label mark can carry out clearly.

[0028] (2) Fade to a label mark and a blur or disappearance does not arise.

[0029] (3) Protection of a resistor layer and protection of a label mark can be performed by the same protective layer.

[0030] (4) The front face of a chip resistor can be made smooth, and since it can improve adsorbent [by the attraction collet], positive mounting can be performed.

[0031] (5) A trimming slot can be certainly fill uped with the same process as a label mark, and a reliable chip resistor can be obtained.

PRIOR ART

[Description of the Prior Art] Generally on the surface of the chip resistor (a thin film resistor and thick film resistor), label marks, such as an alphabetic character for resistance discernment etc. and a mark, are given. The resistor layer prepared on the insulating substrate is conventionally prepared in the above-mentioned label mark by printing of screen-stencil etc., imprint, etc. on the protective layer of wrap glass.

EFFECT OF THE INVENTION

[Effect of the Invention] The manufacture approach of this invention does the following effectiveness so.

[0027] (1) Even if it is a small chip, a label mark can carry out clearly.

[0028] (2) Fade to a label mark and a blur or disappearance does not arise.

[0029] (3) Protection of a resistor layer and protection of a label mark can be performed by the same protective layer.

[0030] (4) The front face of a chip resistor can be made smooth, and since it can improve adsorbent [by the attraction collet], positive mounting can be performed.

[0031] (5) A trimming slot can be certainly fill uped with the same process as a label mark, and a reliable chip resistor can be obtained.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The above-mentioned chip resistor is also miniaturized along with the miniaturization of the electronic parts which advance increasingly recently, and it is becoming impossible however, to be unable to respond in printing and the imprint which are the conventional label mark formation approach.

[0004] For example, with the chip resistor whose geometry is 1.6x0.8mm, a actual label mark part is set to about 1.0x0.6mm or less, and it becomes indefinite with a thin line with a width of face of about 50 micrometers or more writing it. However, the above-mentioned printing or an imprint will fade that it is incongruent to a detailed label mark, and is going to form a thin line with a width of face of about 50 micrometers or less, or a blur will produce it.

[0005] Moreover, since the above-mentioned label mark is formed on the surface of the protective layer, a label stamp face will be in an exposure. therefore, the time of conveyances usually performed according to the process after the label mark in a production process, for example, the production process of a chip resistor, in the detailed thing which a label mark depends on the above thin lines, such as a braking process and a plating process, etc. -- setting -- the contact with various manufacture devices, a case, etc. -- or grind -- or it is based on components -- grind -- a label mark becomes it blurred "to be alike", or it disappears.

[0006] Furthermore, in a chip resistor front face, the irregularity of ***** will arise in ** by which a label mark is formed in the maximum upper layer. If the dimension of a chip resistor becomes small, the above-mentioned irregularity will reduce the adsorption power of the adsorption collet at the time of mounting, and will cause poor mounting.

[0007] This invention solves the above-mentioned problem, enables a sharp notation also with a detailed label mark, and aims at offering the manufature approach of the chip resistor which the blur of a label mark, disappearance, etc. do not produce.

CLAIMS

[Claim(s)]

[Claim 1] The manufacture approach of the chip resistor characterized by preparing transparency thru/or a translucent resin protective layer so that a photopolymer may be applied on the insulating substrate with which the resistor layer was formed, may carry out exposure processing of the above-mentioned photopolymer with the mask with which the predetermined label mark pattern was formed, negatives may be developed, a label mark pattern may be formed and the above-mentioned resistor layer and a label mark pattern may be covered.

[Claim 2] The process which forms a resistor layer on an insulating substrate, and the process which trims a resistor layer and adjusts resistance, The process which applies a photopolymer on the above-mentioned insulating substrate containing the above-mentioned resistor layer, The process which forms a wrap protection pattern and a label mark pattern for the trimming slot which carries out exposure processing of the above-mentioned photopolymer with the mask with which the predetermined pattern was formed, develops negatives, and is formed by the above-mentioned trimming, The manufacture approach of the chip resistor characterized by including the process which prepares transparency thru/or a translucent resin protective layer so that the above-mentioned resistor layer, a protection pattern, and a label mark pattern may be covered.

OPERATION

[Function] Since a label mark is performed by the photolithography method, the clear notation which fades even if it is the thin line of the width of face of 1-micrometer order and which is not attained. [0013] A trimming slot can be certainly fill uped with adjusting a photopolymer to hypoviscosity to label mark formation and coincidence.

[0014] Since transparence thru/or a translucent resin protective layer are prepared, a blur or disappearance of a label mark does not arise, but moreover, a front face can be made smooth.

MEANS

[Means for Solving the Problem] It found out that the front face of a chip resistor could moreover be made smooth, without this invention person's having performed the label mark in a chip resistor by the photolithography method, as a result of repeating research wholeheartedly in view of the actual condition of the above-mentioned technique, and the pattern of a label mark having been sharp at the time of a wrap, could tend to read this label mark by transparency thru/or the translucent resin protective layer, and the blur of a label mark, disappearance, etc. arising.

[0009] That is, this invention relates to the manufacture approach of the following chip resistors.

[0010] (1) The manufacture approach of the chip resistor characterized by preparing transparency thru/or a translucent resin protective layer so that a photopolymer may be applied on the insulating substrate with which the resistor layer was formed, may carry out exposure processing of the above-mentioned photopolymer with the mask with which the predetermined label mark pattern was formed, negatives may be developed, a label mark pattern may be formed and the above-mentioned resistor layer and a label mark pattern may be covered.

[0011] (2) The process which forms a resistor layer on an insulating substrate, and the process which trims a resistor layer and adjusts resistance, The process which applies a photopolymer on the above-mentioned insulating substrate containing the above-mentioned resistor layer, The process which forms a wrap protection pattern and a label mark pattern for the trimming slot which carries out exposure processing of the above-mentioned photopolymer with the mask with which the predetermined pattern was formed, develops negatives, and is formed by the above-mentioned trimming, The manufacture approach of the chip resistor characterized by including the process which prepares transparency thru/or a translucent resin protective layer so that the above-mentioned resistor layer, a protection pattern, and a label mark pattern may be covered.

EXAMPLE

[Example] Although the example at the time of applying the manufacture approach of this invention to a chip-like thick film resistor is explained hereafter, referring to a drawing, this invention is not limited to these examples.

[0016] Drawing 1 thru/or drawing 3 are drawings showing the example of this invention, drawing 1 shows the sectional view of the thick film resistor obtained by the approach of this invention, and drawing 2 is a top view explaining the approach of this invention. these drawings -- setting -- a sign 1 -- an insulating substrate -- 2 -- a resistor layer -- 3 -- a label mark patterned layer -- in 4, 5 shows an electrode layer and 6 shows a photopolymer layer for a resin protective layer.

[0017] In drawing 1, the label mark patterned layer 3 is formed on the resistor layer 2. Here, although prepared on the resistor layer 2, the above-mentioned label mark patterned layer 3 may be formed so that a part thru/or all of the label mark patterned layer 3 may start on the insulating substrate 1. And above-mentioned ***** 3 is covered by transparency thru/or the translucent resin protective layer 4 with the outcrop of the resistor layer 2.

[0018] Next, this example is more concretely explained based on drawing 2 (a) - (d).

[0019] Resistance is adjusted forming the resistor layer 2 and the electrode layer 5 on the insulating substrate 1, trimming the resistor layer 2 with laser etc. after that, and forming the trimming slot 7, as shown in drawing 2 (a).

[0020] As shown in drawing 2 (b), the photopolymer layer 6 is formed so that it may become about 1-10 micrometers of thickness on the resistor layer 2 prepared as mentioned above. The photopolymer layer 6 can apply a photopolymer with a spin coat, a roll coat, etc., and can prepare it by performing temporary desiccation. It can be used widely, without limiting the resin which discovers the same operation as the negative mold and positive type in the above-mentioned photoresist as the above-mentioned photopolymer by light (ultraviolet rays are included) besides the photoresist of a well-known negative mold and a positive type, and photosensitive polyimide resin etc. can more specifically be illustrated. Moreover, as for the above-mentioned photopolymer layer 6, it is desirable to be colored by the pigment etc. so that contrast with the layer used as a substrate may become high.

[0021] Next, as shown in drawing 2 (c), sensitization processing is carried out using the mask with which the predetermined label mark pattern was formed in the above-mentioned photopolymer layer 6, a development is carried out, predetermined developer, for example, alkali system organic solvent etc., etc., it leaves a required part (label mark patterned layer 3), and the photopolymer layer 6 is removed. By the above-mentioned sensitization processing, when hardening of the label mark patterned layer 3 is inadequate, light may be again irradiated after the above-mentioned development, and hardening may be promoted further.

[0022] In this example, although the photopolymer layer 6 on the trimming slot 7 was removed, as shown in drawing 3, it may leave the photopolymer layer 6 so that the trimming slot 7 may be filled, and protection patterned layer 3a may be formed with the label mark patterned layer 3. As for the photopolymer layer 6, at this time, being adjusted and applied to hypoviscosity is desirable, the trimming slot 7 can be covered without a clearance by doing in this way, it is lost that a pinhole is generated from the air in the trimming slot 7 when the above-mentioned resin protective layer 4 is formed, or the clearance which is well-informed about the open air arises from the trimming slot 7, and the adverse effect to the resistor layer 2 by moisture encroachment etc. can be prevented more certainly.

[0023] Moreover, although the label mark patterned layer 3 is provided in drawing 2 (c) so that it may leave the photopolymer layer 6 of ***** , only ***** is removed and you may make it leave the photopolymer layer 6 of the perimeter.

[0024] and it is shown in drawing 2 (d) -- as -- the outcrop of the label mark patterned layer 3 and the resistor layer 2 -- a wrap -- like -- screen printing and FOTORISO -- the translucent resin protective layer 4 which differs from the foreground color of transparency or the label mark patterned layer 3 by law etc. is formed.

[0025] Above, although the approach of this invention was explained about the thick film resistor, the

approach of this invention can apply it also in manufacture of a thin film resistor.

h

g cg b

eb cg e e